

REMARKS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1-14 and 16 are currently pending. Claim 15 has been cancelled without prejudice or disclaimer; and Claims 1-14 and 16 have been amended by the present amendment. The changes to the claims are supported by the originally filed specification and do not add new matter.

In the outstanding Office Action, the Abstract was objected to as exceeding 150 words; Claim 15 was objected to as containing an informality; Claims 1-6, 9, 11, 12, and 14-16 were rejected under 35 U.S.C. §102(a) as being anticipated by WO International Publication No. 02/095730 to Ming (hereinafter “the ‘730 publication”); Claims 7, 8, and 10 were rejected under 35 U.S.C. §103(a) as being unpatentable over the ‘730 publication in view of K.K. Paliwal, “On the Use of Filter-Bank Energies as Features for Robust Speech Recognition,” August 1999; pp. 641-644 (hereinafter “the Paliwal publication”); and Claim 13 was rejected under 35 U.S.C. §103(a) as being unpatentable over the ‘730 publication in view of Nadeu et al., “Time and Frequency Filtering of Filter-Bank Energies for Robust HMM Speech Recognition,” Speech Communication 34 (2001) pp. 93-114 (hereinafter “the Nadeu publication”).

Regarding the objection to Claim 15, Applicants respectfully submit that the objection to that claim is rendered moot by the present cancellation of Claim 15.

Amended Claim 1 is directed to a method for preprocessing speech, comprising the steps of: (1) receiving a speech signal; (2) separating an entire spectrum of said speech signal into a number of predetermined frequency sub-bands; (3) analyzing said speech signal within each of said frequency sub-bands; (4) generating respective band-dependent acoustic feature data for each of said respective frequency sub-bands, the band-dependent acoustic feature

data being at least in part representative of said speech signal with respect to a respective frequency sub-band; (6) deriving band-dependent likelihoods for occurrences of speech elements or of sequences thereof within said speech signal based on said band-dependent acoustic feature data; (7) analyzing said speech signal within said entire spectrum; (8) generating full-band acoustic feature data, the full-band acoustic feature data being at least in part representative of said speech signal with respect to said entire spectrum; (9) deriving a full-band likelihood for occurrences of speech elements or of sequences thereof within said speech signal based on said full-band acoustic feature data; and (10) deriving an overall likelihood for occurrences of speech elements or of sequences thereof within said speech signal based on said band-dependent likelihoods and said full-band likelihood. Claim 1 has been amended for the purpose of clarification only and no new matter has been added.

Regarding the rejection of Claim 1 under 35 U.S.C. §102(a), the '730 publication is directed to the interpretation of features for signal processing in pattern recognition. In particular, the '730 publication discloses a sub-band approach for speech recognition involving partial unknown frequency-band corruption.¹

The outstanding Office Action cites page 24, lines 10-13 of the '730 publication, as teaching analyzing said speech signal within said entire spectrum; generating full-band acoustic feature data, the full-band acoustic feature data being at least in part representative of said speech signal with respect to said entire spectrum; deriving a full-band likelihood for occurrences of speech elements or of sequences thereof within said speech signal based on said full-band acoustic feature data, as recited in Claim 1. Further, the Office Action cites page 19, line 24 to page 20, line 24 of the '730 publication for deriving an overall likelihood for occurrences of speech elements or of sequences thereof within said speech signal based on said band-dependent likelihoods and said full-band likelihood of Claim 1.

¹ The '730 publication, see page 3, lines 1 and 2.

However, page 24, lines 10-13, of the '730 publication, is directed to experiments that were performed to compare the results obtained from a union model, based on sub-band features, to independently obtained results, based on a hidden Markov model (HMM) using full-band features.² The full-band features of the '730 publication are completely independent from the disclosed union model. Further, page 19, line 24 to page 20, line 24 of the '730 publication merely discloses deriving a likelihood based only on band-dependent likelihoods.

The '730 publication does not disclose analyzing said speech signal within said entire spectrum; generating full-band acoustic feature data, the full-band acoustic feature data being at least in part representative of said speech signal with respect to said entire spectrum; deriving a full-band likelihood for occurrences of speech elements or of sequences thereof within said speech signal based on said full-band acoustic feature data; and deriving an overall likelihood for occurrences of speech elements or of sequences thereof within said speech signal based on said band-dependent likelihoods and said full-band likelihood.

Accordingly, Applicants respectfully traverse the rejection of Claim 1 (and all associated dependent claims) as anticipated by the '730 publication.

Amended Claims 14 and 16 recite limitations analogous to the limitations recited in Claim 1. Accordingly, for reasons analogous to the reasons stated above for the patentability of Claim 1, Applicants respectfully traverse the rejections of Claims 14 and 16 as anticipated by the '730 publication.

Regarding the rejections of dependent Claims 7, 8, and 10 under 35 U.S.C. §103(a), it is respectfully submitted that the Paliwal publication fails to remedy the deficiencies of the '730 publication, as discussed above. Accordingly, it is respectfully submitted that Claims 7, 8, and 10 patentably define over the '730 and Paliwal publications.

² The '730 publication, see page 16, line 18 to page 17, line 17; page 23, line 26; page 25, lines 22-25.

Regarding the rejection of dependent Claim 13 under 35 U.S.C. §103(a), it is respectfully submitted that the Nadeu publication fails to remedy the deficiencies of the '730 publication, as discussed above. Accordingly, it is respectfully submitted that Claim 13 patentably defines over any proper combination of the '730 and Nadeu publications.

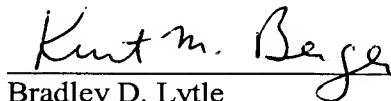
Regarding the rejection of Claim 15 under 35 U.S.C. § 102(a), Applicants respectfully submit that the rejection of that claim is rendered moot by the present cancellation of Claim 15.

Thus, it is respectfully submitted that independent Claims 1, 14, and 16 (and all associated dependent claims) patentably define over any proper combination of the '730, Paliwal, and Nadeu publications.

Consequently, in view of the present amendment and in light of the above discussion, the outstanding grounds for rejection are believed to have been overcome. The application as amended herewith is believed to be in condition for formal allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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